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(56) Documents Cited  
GB 2217229 A WO 98/17745 A1 US 4158551 A  
Chemical Abstract No. 95:135609 & DE 002940782 A  
Chemical Abstract No. 124:150659 & CZ 000279704 B  
Chemical Abstract No. 115:12293 & JP 030068689 A2

(58) Field of Search  
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(54) Abstract Title  
**Solubilising water and petrol**

(57) Water and petrol (gasoline) are formed into a clear stable homogenous solution by adding an effective amount of a complex mixture of higher fatty acid diethanolamides derived from coconut oil, or its synthetic equivalent, to the water-petrol mixture. Typical proportions of the complex mixture of higher fatty acid diethanolamides (in parts by volume) relative to the volume of water present in the petrol range from 0.5:1 to 2:1. The process can additionally assist in the blending of petrol and water with extenders (such as ethanol), which do not have a significant water-solubilising effect.

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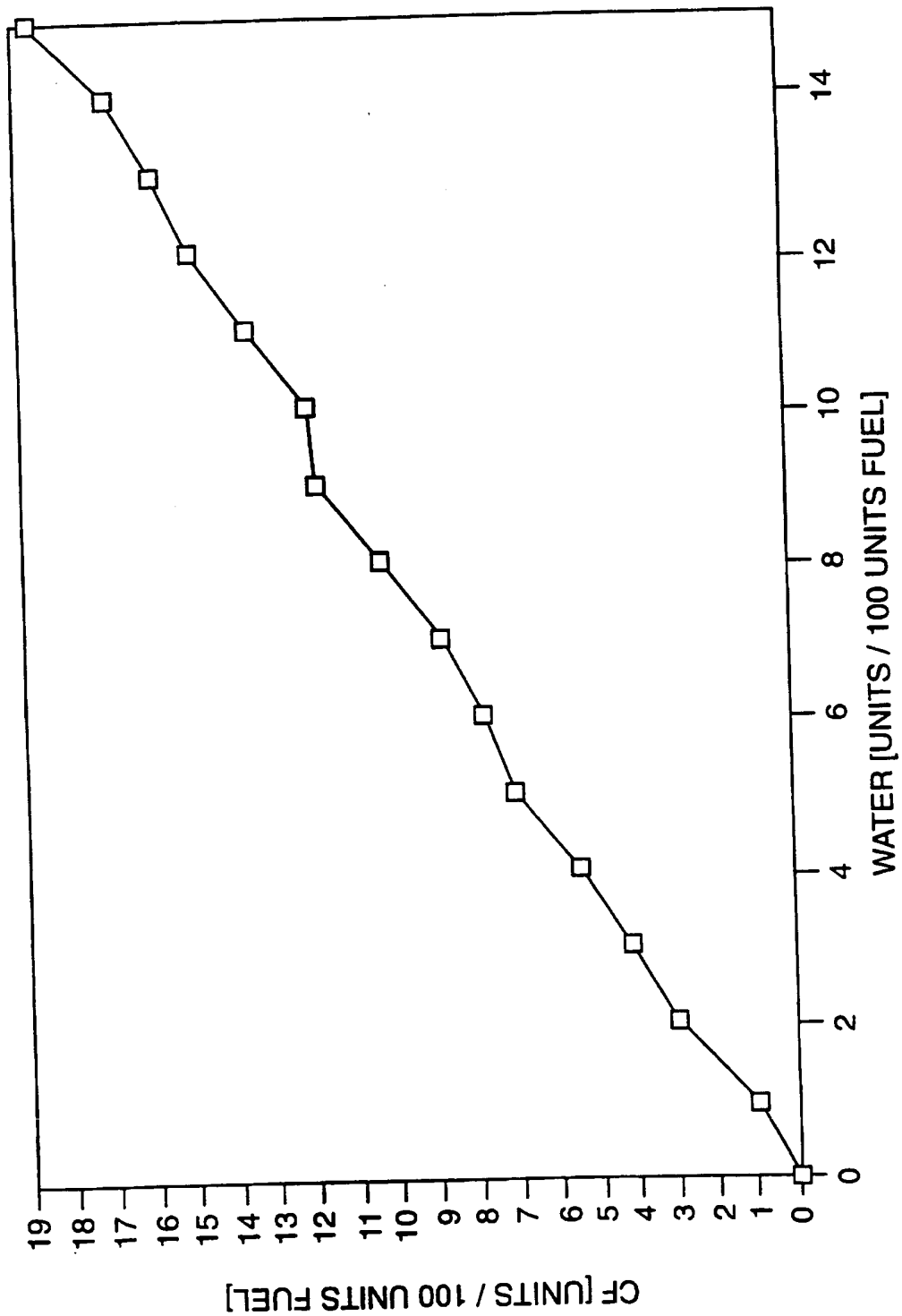
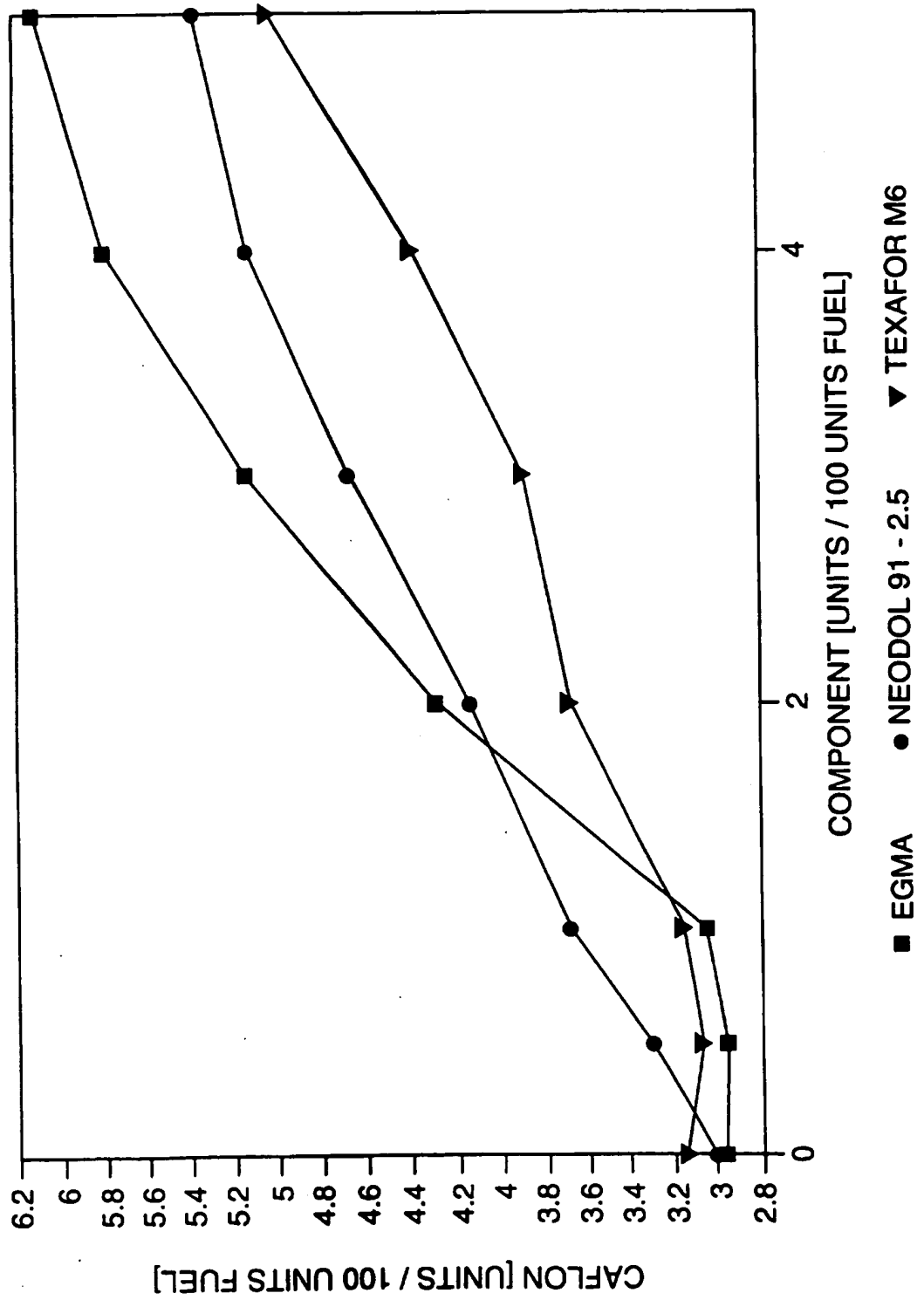
**FIG.1**

FIG. 2



## SOLUBILISING PROCESS

This invention relates to a process that enables water and petrol (gasoline) to be combined into a mixture which behaves as a clear stable homogeneous solution.

5        The presence of water in petrol can cause a number of difficulties. If the water is present as an undesired contaminant, the burning of the resultant fuel is often uneven or, if the fuel is used in an engine, erratic running and stalling often results together with a serious risk of corrosion. In addition, the presence of water in petrol in amounts too small to give rise to such difficulties can still be undesirable as it can produce a lack of clarity or  
10        haze which is unappealing to the consumer. On the other hand, there are occasions when it might be desirable to be able deliberately to blend water with petrol in a stable mixture either directly as an extender or to assist in the blending of other extenders (e.g. alcohols), for the known improvements in performance and cleaner exhaust emission that may result.

      A large number of attempts have been made to deal with these problems by  
15        seeking to create stable emulsions of petrol with water. Such attempts, even with proprietary brands of additives, have not been wholly successful because long-term stability of the resulting mix cannot be achieved in practice. In addition, a number of prior formulations have required the use of several different additives, with associated difficulties in the storage and mixing of those components.

20        The present invention provides a simplified process for dealing with the problem of water contamination in petrol which comprises treating the water-petrol mixture with a single readily available component in relatively low amounts.

      According to the present invention there is provided a process for combining petrol and water as a stable solution that comprises adding an effective amount of a  
25        complex mixture of higher fatty acid diethanolamides derived from coconut oil, or from its synthetic equivalent, to the water-petrol mixture. The presence of other components is not precluded, but it is contemplated that the complex mixture of higher fatty acid diethanolamides would normally be added as essentially the sole additive in the process of the present invention. As already mentioned, the process of the invention can assist in  
30        the blending of petrol and water with extenders (e.g. an alcohols, such as ethanol), which do not have a significant water-solubilising effect.

      The complex mixture of higher fatty acid diethanolamides derived from coconut oil, or from its synthetic equivalent, is to be understood as being "complex" in the sense

that it contains a plurality of different chemicals of the diethanolamide species, including lauric, myristic, and oleic diethanolamides in significant quantities, generally together with other diethanolamides in less significant quantities, and generally a number of unidentified ingredients, possibly including such compounds as monoethanolamides and others that  
5 were present in the original biological source or were obtained as by-products during formation of the diethanolamides. "Caflon CD" (Trade Mark) is a suitable commercially available mixture, largely composed of diethanolamides, derived from coconut oil.

As used herein the term "petrol" includes both the pure hydrocarbon fractions and petrol containing conventional additives that are present in the formulations offered for  
10 sale to the public.

The process of the present invention allows the formation of petrol-water mixtures that are true solutions or behave as such. Any mixture that is clear, homogeneous and has substantially the same stability as a true solution is thus to be regarded as a "stable solution" for the purposes of the present invention.

15 It was unexpected that this surfactant should be so effective, as other surfactants have been unable to achieve this effect as a single component when added in practicable amounts.

In the process according to the present invention, suitable proportions of the complex mixture of higher fatty acid diethanolamides, in parts by volume relative to the  
20 parts by volume of water present in the petrol, range from 0.5:1 to 2:1 and preferably range from approximately 1:1 for 1% water contamination, approximately 1.4:1 to 1.5:1 for greater than 1 to 5% water contamination, and 1.2:1 to 1.3:1 for greater than 5 to 15% water contamination. The mixture of higher fatty acid diethanolamides is added to the water-containing petrol and is mixed in with agitation.

25 The following example illustrates the process of the invention and its use for the formation of stable solutions of petrol and oil.

#### Example.

In this example Caflon was used as the mixture of higher fatty acid  
30 diethanolamides.

Whereas alcohol ethoxylates have found use as the major component in treating water-containing diesel to form a clear stable homogeneous solution, tests have shown that, in contrast, water-containing petrol forms such stable solutions on the addition of

Caflon alone. In order to test its effectiveness, Caflon was titrated with various concentrations of water-petrol mixtures until a clear stable solution was obtained as the end-point.

The following table and Fig 1 show the amounts of Caflon that were required to be added to water-containing petrol to produce such a clear solution.

Parts by volume of water per 100 parts by volume of petrol	Parts by volume of Caflon per 100 parts by volume of petrol
1.0	1.00
2.0	3.00
3.0	4.20
4.0	5.50
5.0	7.10
6.0	7.80
7.0	8.80
8.0	10.35
9.0	11.90
10.0	12.10
11.0	13.60
12.0	15.00
13.0	15.90
14.0	17.00
15.0	18.60

The results suggest a nearly linear relationship between Caflon requirement and water content.

It will be seen that the ratio of Caflon to water by volume was found to vary between 1.5:1 at 2% water contamination of the petrol to 1.2:1 at 10%, and greater, water contamination.

The effect of the usual components which had been found to be effective in solubilising diesel-water mixtures (i.e. Neodol 91 2.5 – alcohol ethoxylate; Texafor M6 - an polyglycol ether of a higher fatty acid; and Egme- an alcohol ethoxylate ethylene glycol monobutyl ether/ ester) were tested by carrying out further similar titrations with varying amounts of each of those additives in association with Caflon. All the other components showed a negative effect, i.e., each of the components caused an increase in

the Caflon required to form clear solution (see Figure2). There is therefore no benefit from using components other than Caflon alone as the solubilising agent for water-petrol mixtures.

- 5           It will of course be understood that the present invention has been described above purely by way of example, and that modifications of detail can be made within the scope of this invention.

Claims

1. A process for combining petrol and water as a stable solution comprising adding  
5 an effective amount of a complex mixture of higher fatty acid diethanolamides derived from coconut oil, or from its synthetic equivalent, to the water-petrol mixture.
2. A process according to claim 1 in which a ratio by volume of the complex  
mixture of higher fatty acid diethanolamides to water is approximately 0.5:1 to 2:1.  
10
3. A process according to claim 1 in which a ratio by volume of the complex  
mixture of higher fatty acid diethanolamides to water is approximately 1:1 for 1% by  
volume of water in petrol.
- 15 4. A process according to claim 1 in which a ratio by volume of the complex  
mixture of higher fatty acid diethanolamides to water is 1.4:1 to 1.5:1 for greater than  
1% to 5% by volume of water in petrol.
5. A process according to claim 1 in which a ratio by volume of the complex  
20 mixture of higher fatty acid diethanolamides to water is 1.2:1 to 1.3:1 for greater than  
5% to 15% by volume of water in petrol.
6. A process according to any of claims 1 to 5 in which an extender is also blended  
with water-petrol mixture.  
25
7. A process according to claim 6 in which the extender is ethanol.
8. A process according to claim 1, substantially as described in the Example.
- 30 9. Complex mixtures of higher fatty acid diethanolamides derived from coconut oil  
when used for the production of stable solutions of water-contaminated petrol.





Application No: GB 9807790.2  
Claims searched: All

Examiner: Michael R. Wendt  
Date of search: 24 July 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): B1V (VB, VE, VF); C5G (GAA, GAB)

Int Cl (Ed.6): C10L 1/22; B01F 17/00, 17/22

Other: Online: WPI, Claims, Japio, CAS

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2217229 A (ENERSOLVE) e.g. see Claims.	
A,E	WO 98/17745 A1 (HAZEL) e.g. see page 1 at paragraph 3. Claim 1. Example 1.	1 & 9
X	US 4158551 (FEUERMAN) e.g. see Example 3.	---"
X	Chemical Abstract No. 95:135609 & DE 2940782 A (HENKEL). See Abstract.	---"
X	Chemical Abstract No. 124:150659 & CZ 0279704 B (PANOCH). See Abstract.	---"
A	Chemical Abstract No. 115:12293 & JP 030068689 A2 (SANYU). See Abstract.	

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
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A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
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